

Evaluation of diversity and habitat types of some orchid species growing in Kashmir Himalaya

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ABSTRACT

Orchidaceae is a monocot family of herbaceous perennials that include terrestrial, saprophytic, lithophytic and epiphytic species. It is one of the largest families among angiosperms with 800 genera and about 25, 000 species, distributed worldwide. Orchids comprise the highly evolved and economically important plants bearing the most beautiful and attractive flowers in the plant kingdom. From last 120 years a number of plant explorers have reported the occurrence of orchids from Kashmir Himalaya. In the present study different habitats of Kashmir Himalaya were evaluated for the occurrence of orchids. Ten species (*Cephalanthera longifolia* L., *Cypripedium cordigerum* D.Don., *Dactylorhiza hatagirea* (D. Don) Soo, *Epipactis helleborine* L., *Epipactis royleana* Lindley, *Goodyrea repens* (L.) R.Brown, *Listera ovata* (L.) R. Brown, *Spiranthes sinensis* (Persoon) Ames. *Satyrium nepalense* D.Don., and *Oreorchis micrantha* Lindley., were recorded. Most of the species are terrestrial. *Oreorchis micrantha* reported first time by the authors from the Kashmir valley. These orchid species grow within an altitudinal range of 1595 - 4150m asl. Further, during the present investigation a total of three habitat types have been identified which include swamps or marshy lands, shady coniferous forests of sub-alpines and open moist land of alpine. One species *Spiranthes sinensis* grows in swamps, seven species (*Cephalanthera longifolia*, *Cypripedium cordigerum*, *Epipactis helleborine*, *Epipactis royleana*, *Goodyrea repens*, *Listera ovata*, *Oreorchis micrantha*) grows in shady coniferous forests of sub-alpines and two species (*Dactylorhiza hatagirea*, *Satyrium nepalense*) grows in open moist land of alpine. Thus from the present study it is evident that the shady coniferous forests harbor most of the orchid species in Kashmir Himalaya.

Key words: orchids, saprophytic, terrestrial, altitudinal range, swamps, coniferous forests, moist alpine.

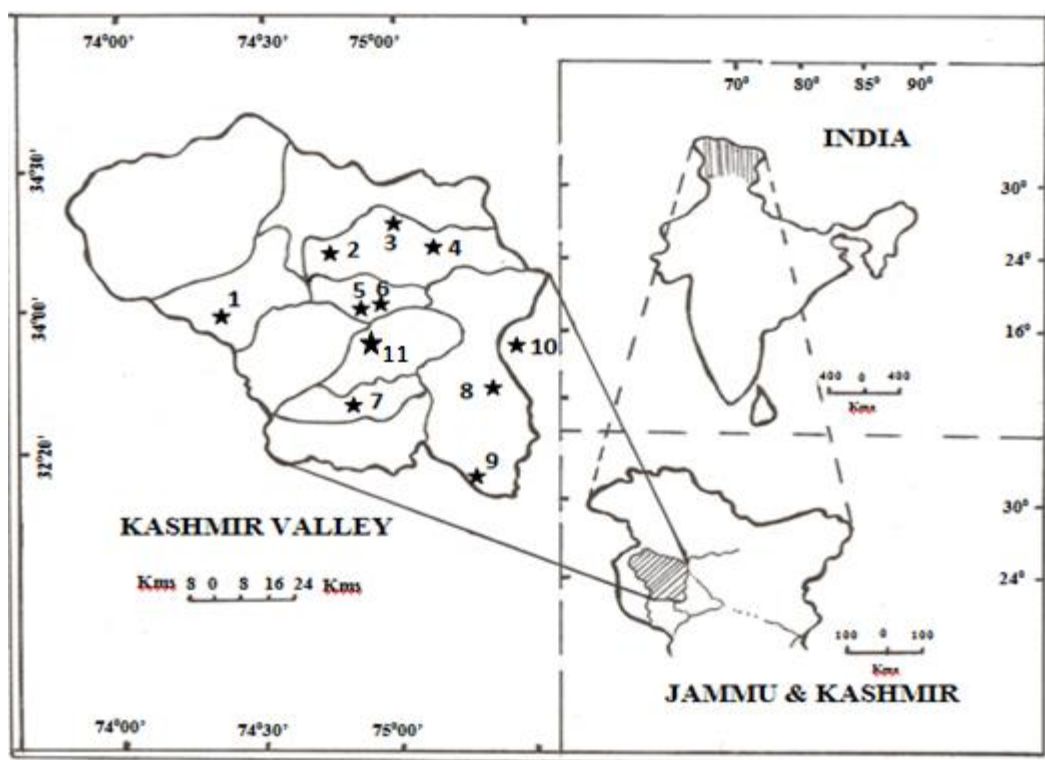
Abbreviations: KASH- Kashmir University Herbarium

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1= Ferozpora (Tangmarg- Gulmarg); 2= Manasbal; 3= Vaishn Sar; 4= Sonamarg; 5= Dachigam National Park; 6= Check-e- Sangri (Dagwan); 7= Aharbal; 8= Daksum; 9= Jawhar Tunnel; 10= Wadwan (Kishtiwar); 11= Anchar

Figure 1

Collection sites of various orchid species in Kashmir Himalaya

in different regions because of the prevailing environmental conditions of that region (Jalal, 2012). Orchids are not only habitat specific but within a habitat they require unique micro-climatic conditions to survive and perpetuate (Jalal and Rawat, 2009). In Kashmir Himalaya, the earlier work on orchids mostly concentrated on their taxonomic enumeration (Duthie, 1906; Deva, 1986; Pangtey, 1991; Akhter et al., 2011), but their ecological study in this part of the world is still wanting. The present study therefore, is an attempt to study the habitat types, distributional range and eco-climatic zones of the different orchid species growing in Kashmir Himalaya.

2. MATERIALS AND METHODS

Kashmir Himalaya is situated in northern fringe of the Indian sub-continent between 33°22' and 34°50' N latitudes and 73°55' and 73°33' E longitudes covering an area of about 2, 22,797sq Km. Extensive field surveys were conducted between the months of April to October (2010 - 2013) covering an altitudinal range of 1595 - 4150 m. Surveys were undertaken in south, central, north and western Kashmir at 11 different sites (Figure 1). For each orchid species, the specimens were collected and processed for herbarium preparation and latter deposited at Kashmir University Herbarium (KASH). Voucher Specimen Numbers-1830-1839 (Ref.No.F/Herbarium-Specimen vouchers) KU/2013). Field notes of each species, habitat types and geo-coordinates of various sites were recorded.

3. RESULTS

During the present study 10 species of orchids growing in Kashmir Himalaya were recorded growing in different habitats (Figure 2), however, most of the species are terrestrial. These species belong to 9 genera; the genus *Epipactis* constitutes two species and other 9 genera with single species each (Table 1). Of the 10 species reported *Oreorchis micrantha* Lind., is being reported for the first time from Kashmir valley. It is a well known fact orchids inhabit wide range of habitats; however, they require unique micro-climatic conditions to survive and perpetuate. The present study revealed that these orchid species grow within an altitudinal range of 1595 - 4150m asl and are distributed in different eco-climatic zones (Figure 3). During the present study it was observed that these species inhabit 3 different

1. INTRODUCTION

Orchids represent a group of botanically significant and economically important plants distributed in all the continents except Antarctica; the greatest diversity, however, occurs in tropical and subtropical region (Pridegeon et al., 1999). Orchids occupy a wide range of habitats and exhibit highly specialized morphological, structural and physiological characteristics (Dressler, 1990). It is one of the largest family among monocots and the second largest family among angiosperms with an estimate of 800 genera and about 25, 000 species distributed worldwide (Chug et al., 2009). Orchids are also grown as a cash crop in several countries including Thailand, Malaysia, Singapore South Korea and Sri Lanka (Vij and Pathak, 2012).

In India orchids grow from sea level to the alpine regions but their number vary

Table 1

Habitat, Collection sites and geo coordinates of Orchid species evaluated during the present study

Species	Habitat	Collection sites	Altitude (m asl)	Latitude/Longitude
<i>Cephalanthera longifolia</i> (L.) Fritch	Terrestrial mostly grows in moist coniferous forests.	Dachigam	2243	34°37.021'N 74°09.341' E
		Naranag	2216	34°21.104'N 74°56.425' E
<i>Cypripedium cordigerum</i> D.Don.	Terrestrial mostly grows in moist coniferous forests.	Gulmarg	2771	34°02'.671'N 74°22'.920' E
<i>Dactylorhiza hatagirea</i> (D.Don) Soo	Terrestrial mostly grows in moist alpine meadows and under the shade of Birches	Vaishansar	3645	34°24.109'N 75°08.122' E
		Nagamandi	3549	34°22.321'N 74°03.321' E
		Ferozpura	2230	34°02.983'N 74°25.497' E
		Gulmarg	2684	34°02.930'N 74°23.616' E
<i>Epipactis helleborine</i> (L.) Crantz.	Terrestrial mostly grows in moist coniferous forests rich in humus.	Dachigam	2345	34°45.021'N 74°07.243' E
		Daksum	2565	34°75.056'N 74°21.453' E
		Wadwan	2840	33°50.095'N 75 °32.514' E
<i>Epipactis royleana</i> Lindl.	Terrestrial orchid grows in humus rich moist coniferous forests.	Dachigam	2245	34°45.021'N 74°07.243' E
		Daksum	2643	34°67.043'N 74°87.832' E
		Wadwan	2840	33°50.095'N 75 °32.514' E
		Dagwan	3022	34°10.588'N 74°57.670' E
		Gulmarg	2771	34°02'.661'N 74°22'.92' E
		Aharbal	2667	33°38'.387'N 74°46'.90' E
<i>Goodyrea repens</i> R. Brown	Terrestrial orchid grows in humus rich moist coniferous forests. Grows on decaying wood logs.	Ferozpura	2174	34°02.983'N 74°25.497' E
		Daksum	2943	33°45.035'N 75°23.814' E
		Jawhar tunnel	2890	33°29.228'N 75°13.917' E
		Dagwan	2807	34°18.342'N 74°51.621' E
		Gulmarg	2771	34°02.6671N 74°22.926' E
		Phalgam	2498	34°03.040 N 75°21.665' E
<i>Listera ovata</i> (L.) R. Brown	Terrestrial orchid grows in humus rich moist coniferous forests.	Dachigam	2122	34°34.083'N 74°06.167' E
		Checksangri	2215	34°17.765'N 74°51.432' E
		Daksum	2740	33°27.021'N 75° 34.358' E
<i>Spiranthes sinensis</i> (Pers.) Ames	Terrestrial orchid (Semi aquatic) grows in grassy moist pastures near to water bodies.	Manasbal	1630	34°14.994'N 74°40.670' E
		Anchar	1607	34°15.763'N 74°50.430' E
<i>Satyrium nepalense</i> D.Don.	Terrestrial mostly grows in moist slopes of alpine region.	Yaishansar	4076	34°23.068'N 75°10.930' E
<i>Oreorchis micrantha</i> Lindl.	Terrestrial orchid grows in humus rich moist coniferous forests.	Dachigam	2372	34°67.056'N 74°01.423' E
		Checksangri	2735	34°06.834'N 74°58.286' E

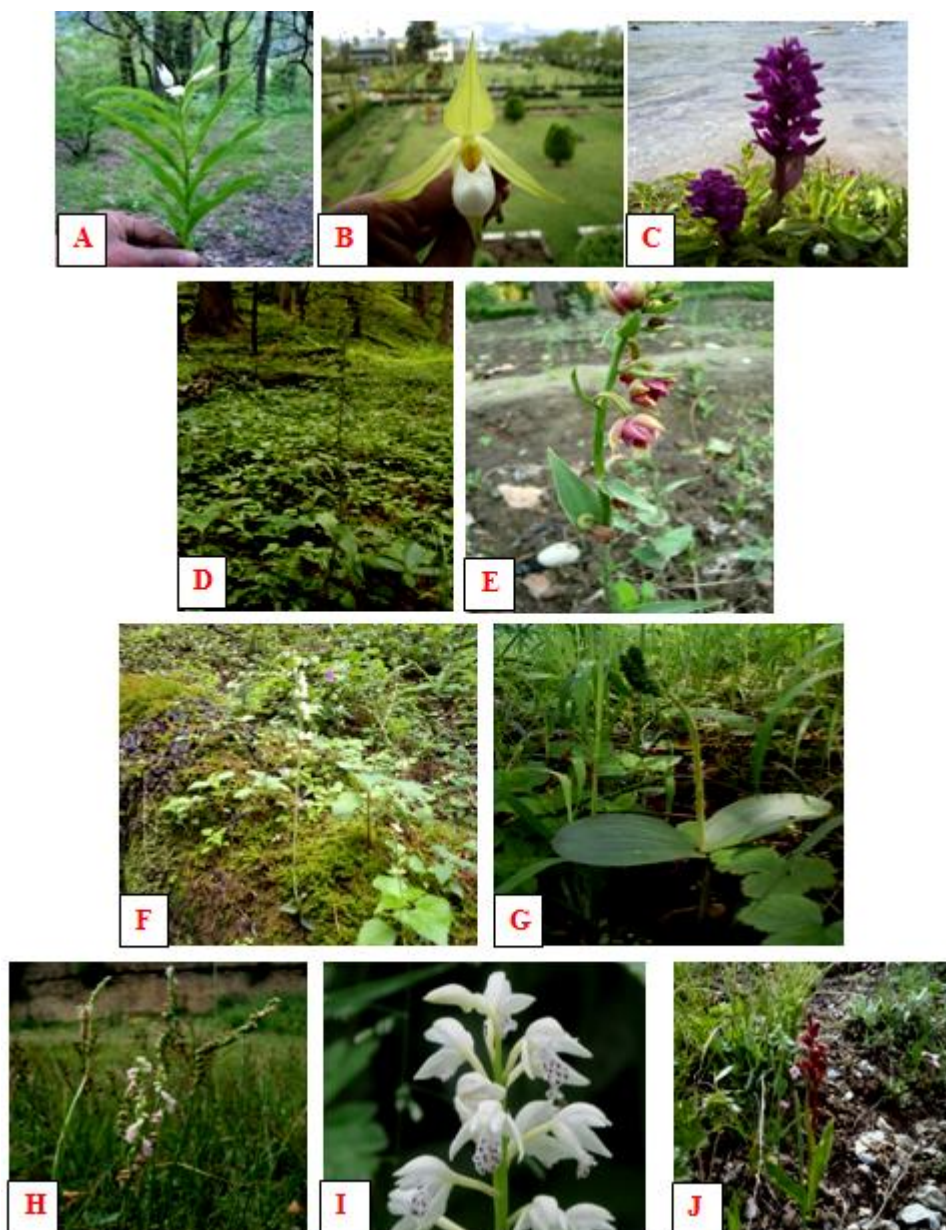


Figure 2

Orchid species evaluated for habitat diversity during the present study.

A. *Cephalanthera longifolia* L., **B.** *Cypripedium cordigerum* D.Don., **C.** *Dactylorhiza hatagirea* (D. Don) Soo, **D.** *Epipactis helleborine* L., **E.** *Epipactis royleana* Lindley, **F.** *Goodyrea repens* (L.) R.Brown, **G.** *Listera ovata* (L.) R. Brown, **H.** *Spiranthes sinensis* (Persoon) Ames. **I.** *Satyrium nepalense* D.Don., **J.** *Oreorchis micrantha* Lindley

types of habitats which include: marshy lands, shady coniferous forests of sub-alpines and open moist land of alpines with the largest numbers (69.23%) distributed in shady coniferous forests (Figure 4).

4. DISCUSSION

Orchids grow in habitats with most sticking features. The present study revealed that more number of species are growing in shady coniferous forests. The occurrence of orchid species in such habitats may be due to mycorrhizal association (Hegde, 1982). Altitude plays a significant role in determining the forest type, communities and species distribution in mountainous regions and also represents a complex gradient along which many environmental

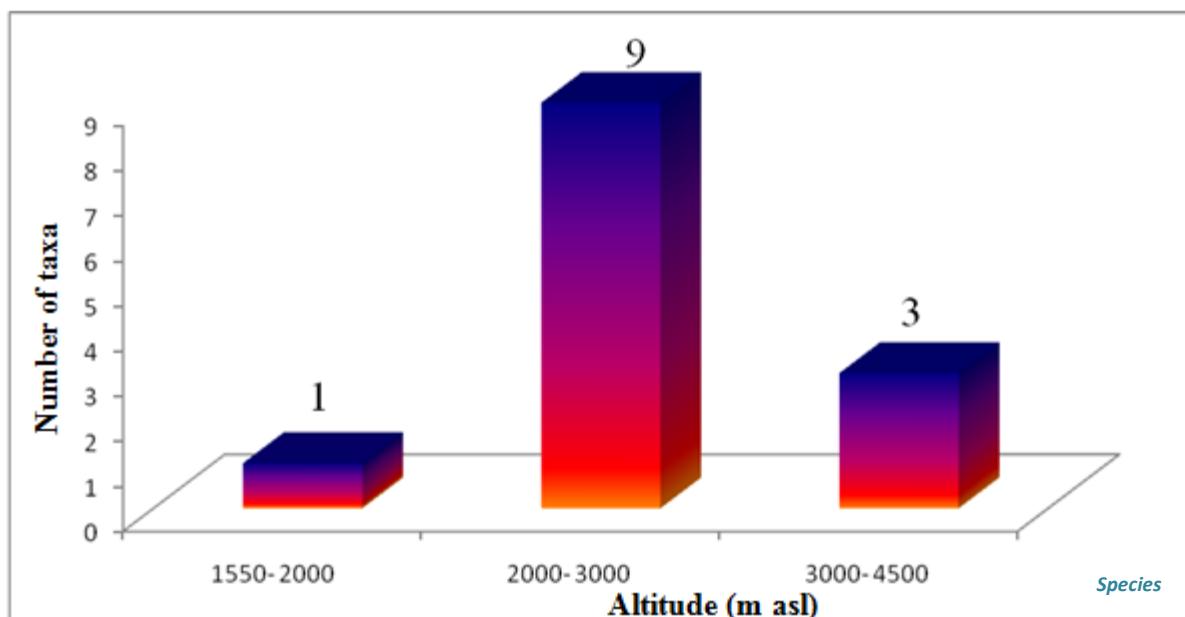


Figure 3

Distribution of various orchids with respect to altitudinal gradient

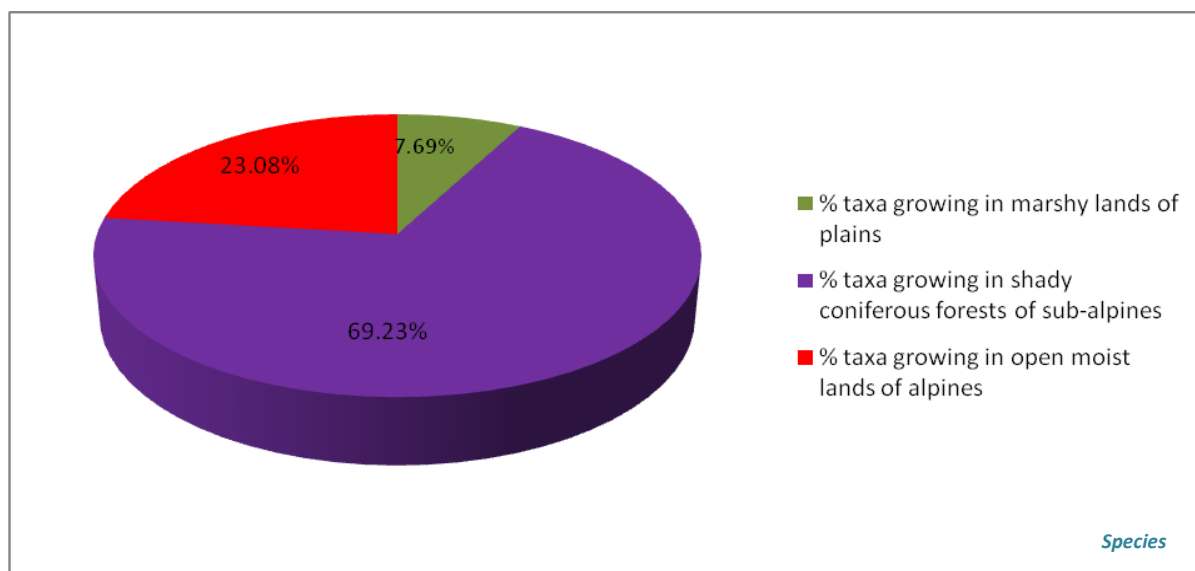


Figure 4

Percentage of taxa growing in different habitats

variables change concomitantly (Whittaker, 1967). The present study revealed that maximum representation of orchid species occur between altitudinal gradient of 2000-3000m asl. This zone provides all the suitable condition for the growth and development of orchids (Jalal, 2012). The low species richness of orchids at lower altitudes may be attributed to little rain fall and higher temperature because soils with less moisture and high temperature harm the orchid growth. Terrestrial orchids usually grow at the places where sufficient shade and moisture is available (Jalal et al., 2010). It was observed that *Goodyrea repens* grows on dead and decaying wood logs and humus rich moist soils. These orchids mostly prefer the places with high moisture, shade and humus rich soils (Jalal et al., 2010). The present study also revealed that the alpine species grow in open and moist places indicating that moisture play very important role in the distribution of these orchid species in alpine zone where temperature is relatively low.

5. CONCLUSION

During the present study 10 species have been recorded. Of these *Oreorchis micrantha* have been recorded for the first time from Kashmir valley. Majority of the species recorded were terrestrial and mostly growing in shady coniferous forests of sub-alpines. These species inhabit three types of habitats viz: marshy lands, shady coniferous forests of sub-alpines and open moist land of alpines.

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The present study is an attempt to give an account of the current status of orchids based on recent surveys since 2002 to 2010 in various parts of western Himalaya. Based on rarity Index of species, orchids are categorised in four groups, very rare, sparse, occasional and common. Results show that 40% of orchid species are very rare, 26% are sparse, 19% are occasional and 15% are common in western Himalaya. For the conservation of orchids, two orchid conservation areas are identified in Gori Valley and Mandal Valley.

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